

**REMARKS**

Applicants respectfully request favorable reconsideration of this application.

Claims 1-3, 5, and 7-19 were rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over “Aluminum and Aluminum Alloys” pages 98-101, 220, 718-719, and 722. Applicants respectfully traverse.

The Office Action cites a new reference, namely an ASM Speciality Handbook entitled “Aluminium and Aluminium Alloys” published in 1993 (“Alloys ‘93”), as support for the rejections of the subject claims. As will become apparent, however, the Examiner incorrectly selectively relies upon disclosures on pages 98-101, 220, 718-719, and 722 of Alloys ‘93 to support the rejections.

The Examiner argues that the disclosure in Alloys ‘93 is more relevant to Applicants’ invention than that of references cited in a previous Office Action. The primary reference in the previous Office Action is another ASM Handbook. In response to the previous Office Action, Applicants filed a Declaration dated 27 September 2002, by Malcolm Couper, one of the inventors. The Couper declaration provides a technical discussion of the invention and the disclosure in the previously cited ASM Handbook. It is clear from the Couper declaration that the ASM Handbook reference fails to disclose, teach, or suggest Applicants’ claimed invention. In item 5 of the Office Action, the Examiner states that the Couper declaration is “partially sufficient” to overcome the rejection of the claims in the previous Office Action. The Examiner then suggests in item 6 of the Office Action that Alloys ‘93 is a more relevant reference.

It is important to note, however, that Alloys ‘93, as is the case with the previously cited ASM Handbook reference, is a detailed document containing a substantial amount

of information on the subject of aluminium and aluminium alloys, and it is not reasonable for the Examiner to select and string together essentially unrelated disclosures from sections of Alloys '93 in an attempt to produce Applicants' claimed invention. In effect, the Examiner has undertaken an ex post facto analysis of Alloys '93. Specifically, the Examiner has looked to isolated and disparate portions of Alloys '93 to find aspects of Applicants' claimed invention. Moreover, the selected portions of the reference do not disclose, teach, or suggest the claimed invention, and there is no basis upon which to reasonably conclude that one skilled in the art would have located and combined the isolated portions in Alloys '93 from the overall substantial reference without the benefit of Applicants' invention disclosure.

Applicants' invention is concerned with overcoming a problem that has a substantial impact on performance of a particular class of aluminium alloys. The problem is caused by impurities, principally silicon, magnesium, and iron that form a brittle impurity  $\pi$  phase in the microstructure of cast alloys. The invention is based on a realization that it is possible to at least substantially eliminate the  $\pi$  phase by solution heat treatment of a casting of the aluminium alloy. Specifically, the invention is based on the realization that solution heat treatment under particular conditions can transform the undesirable  $\pi$  phase to a less problematic  $\beta$  phase of the impurities.

Applicants' invention is defined as an aluminium alloy in terms of a combination of (a) a narrowly defined composition and (b) a particular microstructure and as a method in terms of solution heat treatment of a cast alloy.

The Examiner acknowledges on page 3 of the Office Action that the applied reference, namely Alloys '93, fails to disclose the microstructure of Applicants' claimed invention. Instead, the Examiner relies on heat treatment data corresponding to a

different alloy than that of Applicants' claimed invention to conclude that the claimed microstructure must form in the alloy listed in Alloys '93 and then suggests that this data is evidence of "inherency."

In particular, the Examiner relies on the information in Table 36 on page 722 of Alloys '93. Table 36, however, is not as relevant as suggested by the Examiner and, when considered properly, does not support a conclusion of "inherency." Specifically, Table 36 lists heat treatments for separately cast test bars of alloys 356.0 and A356.0. Table 36 lists solution heat treatments at temperatures of 535-540°C for sand castings and permanent mold castings for periods of time of 12 hours in the case of sand castings and 8 hours in the case of permanent mold castings. It is important to note, however, that Table 36 indicates that the solution heat treatment times for both sand castings and permanent mold castings "can be decreased or may have to be increased depending on experience with particular castings." Indeed, the table makes it very clear that the particular time periods of 12 hours and 8 hours for sand castings and permanent mold castings, respectively, are only guidelines and that longer or shorter times could be used, as required. This proviso renders the information in the table very general at best. Page 8 of Applicants' specification describes that a solution heat treatment of a particular aluminium alloy at a temperature of 540°C for a time of 2 or more hours produced "desired levels of transformation of  $\pi$  to  $\beta$  phase". The aluminium alloy in the example on page 8 had a magnesium concentration of 0.5%. In contrast, page 718 of Alloys '93 indicates that alloy compositions 356.0 and A356.0 have maximum magnesium concentrations of 0.45%. It is, therefore, not reasonable to equate the information provided in Table 36 and on page 718 of Alloys '93 with the disclosure on page 8 of Applicants' specification and conclude that Alloys '93 discloses, teaches, or suggests that

solution heat treated aluminium alloys of the type disclosed in Table 36 would have “desired levels of transformation of  $\pi$  to  $\beta$  phase” in accordance with Applicants’ invention. Even if one were to put aside the fact that Alloys ‘93 fails to disclose, teach, or suggest the microstructure of Applicants’ claimed invention, microstructure being a key aspect of Applicants’ invention, it is not reasonable to equate an aluminium alloy having a maximum magnesium concentration of 0.45% to one having a magnesium concentration of 0.5%. Indeed, a concentration difference of 0.05 % is significant. Moreover, it is not reasonable to conclude that a solution heat treatment of 12 hours in the case of sand castings and 8 hours in the case permanent mold castings is “substantially identical” to a solution heat treatment of 2 or more hours in the example disclosed on page 8 of Applicants’ specification. This is particularly evident, given the proviso in Table 36 of Alloys ‘93 that the solution heat treatment times may be increased or decreased depending on required properties.

It follows from the absence of “inherency” in Alloys ‘93 that the fact that the reference does not mention microstructure, microstructure being a key aspect of Applicants’ invention, that invention is patentable over the applied reference.

The statements of Malcolm Couper in his declaration in relation to the previously-cited ASM Handbook are equally applicable to Alloys ‘93. Specifically, the combination of composition and microstructure and solution heat treatment that are the basis of Applicants’ invention are neither disclosed nor obvious in view of the applied reference.

As indicated above, the Examiner argues in item 6 of the Office Action that Alloys ‘93 is more relevant than the previously applied reference. The Examiner relies on the disclosure in Figure 44 of Alloys ‘93 to support this conclusion. However, Figure 44 is identical to Figure 3 of the previously applied ASM Handbook. Figure 3 is

discussed in the Couper declaration and the comments in that declaration are equally applicable to Figure 44 of Alloys '93. Note, for example, the following extract from clause 7 of the Couper declaration.

*“As an example, citation has been made to Fig 3 at page 134 of the ASM Handbook. That figure purports to show that both UTS and percent elongation at fracture consistently decrease with increased dendrite cell size. However, what it doesn't show is that the rate of decrease depends on Mg content. It turns out (unexpectedly) that because of this, for a given dendrite cell size, there is a peak in quality for a given Mg content. Furthermore (also unexpectedly) the optimum Mg content is different for different dendrite cell sizes. It is only in cases (practical applications) where it is strived to have the finest possible dendrite cell size that the benefit of optimizing the Mg content (by narrowing the range) is worthwhile.”*

Moreover, while Figure 44 of Alloys '93 (and Figure 3 of the previously applied reference) include a DAS of 25  $\mu\text{m}$ , such does not amount to a teaching of the use of a fine DAS. Indeed, Figure 44 merely teaches that different DAS result in different mechanical properties.

In summary, as is the case with the previously applied ASM Handbook, Applicants' claimed invention is patentable over the newly applied reference.

The rejections under 35 U.S.C. §§ 102(b) and 103(a) are therefore untenable and should be withdrawn. Applicants believe that the currently pending claims are allowable and respectfully request that the Examiner issue a Notice of Allowance.

Should the Examiner believe that any further action is necessary to place this application in better form for allowance, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

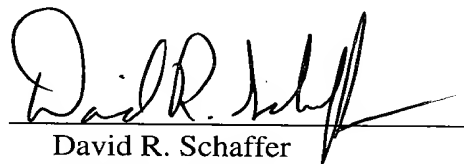
The Commissioner is hereby authorized to charge to Deposit Account No. 50-1165 (T2211-906224) any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by

this paper and to credit any overpayment to that Account. If any extension of time is required in connection with the filing of this paper and has not been separately requested, such extension is hereby requested.

Respectfully submitted,

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